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ON OPERATIONS FOR THE PARTIAL OR TOTAL REMOVAL OF THE EYEBALL.

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The recent very warm advocacy of the operation of *exenteratio bulbi*, by Professor Alfred Graefe, as a general substitute for enucleation[1], has suggested the presentation of a few notes, as perhaps not untimely, on some of the operative procedures which have been proposed for the removal of staphyloma and for the prevention or cure of sympathetic affections of the eye.

Wardrop (*The Morbid Anatomy of the Human Eye*, Second Edition, London, 1834, Ch. XLII,) writes.—

"The eyes * * * have a sympathy with each other, both in health and disease,and this is, perhaps, more remarkable between the eyes than any of the other organs, from the two optic nerves being intimately interwoven. Diseases which were originally confined to one eye are transmitted to the second eye; and even when an eye sustains a slight injury, the other frequently becomes weak and irritable."

"This sympathy between the eyes has not escaped common

1. Excepting, of course, in cases of retinal and choroidal tumors.

observation; and there is a disease, frequent in the eye of the horse, having the appearance of a specific inflammation, which usually first affects one eye and then the other, almost always sooner or later destroying vision. It is known among some farriers, that, if the eye first affected with this disease suppurate and sink in the orbit, the disease does not attack the other eye, or subsides if it has commenced in it. Thus they have adopted a practice of destroying altogether the diseased eye, in order to save the other; which is rudely done done by putting lime between the eyelids, or thrusting a nail into the cavity of the eyeball, so as to excite violent inflammation and suppuration. I have frequently succeeded in saving one eye of the horse by adopting this practice; but I destroyed the eye by simply making an incision in the cornea, and discharging through it the lens and vitreous humor. In some diseases of the human eye, when the disease makes a similar progress, first affecting one eye and then the other with complete blindness, the practice so successful in animals might by judicious discrimination, be beneficially adopted."

"But besides this general consent between the two eyes, there is a striking sympathy between the corresponding textures of each organ. * * * A young man received a wound in the eye which produced violent inflammation of the iris; and in three weeks the iris of the other eye became inflamed."

It appears from this quotation, that Wardrop had a very clear idea of sympathetic disease of the eye, and also that he suggested the true method of combatting it: although he did not discriminate between sympathetic irritation and the more intractable sympathetic iritis and irido-cyclitis, and, therefore, was led to expect greater curative effects from his operation than we now hope for. Wardrop's procedure, of making a free incision of the cornea and "discharging though it the lens and vitreous humor," was in effect a very complete exenteration, at least when supplemented, as it must have been, by general suppuration and destruction of the choroid: its effectiveness in affording relief from sympathetic irritation, and in protecting against the danger of sympathetic inflammation cannot be doubted.

Mackenzie (*A Practical Treatise on the Diseases of the Eye*,

Fourth Edition, London, 1854, p. 411) quotes from the *Medical Gazette*, 1834, a case, of old gun-shot wound of the eye, reported by Dr. Butter, in which the degenerated crystalline lens was first removed, and, a year and a half later, the vitreous humor was let out through an opening made in the sclera: seven months after the latter operation he extirpated the eyeball together with the lachrymal gland, and as much as possible of the optic nerve in which a duck shot was found impacted near its junction with the globe. These successive operations were performed in the hope of affording relief from severe and disabling sympathetic irritation, but this result was attained only after the extirpation. The want of success which attended the extraction of the lens and the evacuation of the vitreous chamber in this case was justly attributed to the insufficiency of these measures to effect the removal of the offending foreign body.

Mackenzie, (*Op. cit.*, p. 412) quoting from Crompton, (*Medical Gazette*, 1837) cites the practice of Mr. Barton, of Manchester, in cases of lodgment of a fragment of percussion cap within the cavity of the eyeball.

"Mr. Barton thinks that the sympathetic inflammation, in these cases, is occasioned by the presence of a fragment of cap in the injured eye, and that the only means of preventing such inflammation, or of allaying it when it has arisen, is the removal of the fragment. * * * "

" * * * The operator forms, by means of Beer's knife, a large flap of the cornea. The knife may now be directed through the pupil and lens, so as to give an opportunity for the lens to come away, along with a part of the vitreous humor, and perhaps the fragment of cap. If there is no appearance of the foreign body in what is discharged from the eye. the flap of the cornea is to be seized with a pair of forceps, and cut away with curved scissors. A dose of laudanum is then given, and a linseed-meal poultice applied over the eyelids. * * * The eye is so exceedingly sensitive that attempts to search for the fragment of the cap cannot be endured. In all Mr. Barton's cases, the cap was found in the poultice, or in the coagulum which closed the opening into the eye one or more days after the operation."

Writing on sympathetic ophthalmitis (Syn. *Iritis sympathetica*) Mackenzie says (*Op. cit.*, p. 621):

"When there is a suspicion that some foreign body is lodged within the injured eye, there can be no question that Mr. Barton's practice ought to be adopted; but even in other cases, why should we hesitate to lay open an eye in which vision is extinguished, if the operation affords a reasonable hope of our being thereby able to save the other?"

Barton's operation, like Wardrop's, must have resulted in the complete emptying of the scleral cavity through suppuration, with subsequent consolidation of the remains of the eyeball into a comparatively small nodule as in cases of total suppuration of the contents of the eyeball from other causes. The nearly perfect immunity from sympathetic complications after panophthalmitis is generally conceded, and there can be no reasonable doubt of the substantial justice of the claims made for Barton's operation in this respect. Moreover as compared with the very radical operation of extirpation of the eyeball, as it was formerly practiced, there can be no doubt that it left the parts in an immensely more favorable condition for the reception of an artificial eye. The distinction, as regards curability, between sympathetic irritation and sympathetic inflammation was not yet clearly formulated.

The modern operation of enucleation, with preservation of the entire conjunctival membrane (O'Ferrall; Dublin, 1841.—Bonnet; *Annales D'Oculistique*, 1842), naturally superseded, for a time, these older operative procedures. The simplicity and apparent safety of the operation, the rapid recovery, the comparatively favorable condition of the parts for the wearing of an artificial eye, and above all the thoroughness of the removal of the diseased and offending organ, gained for the new method immediate and general approval. With the adoption of enucleation the arguments in favor of the preservation of a shrunken nodule of scleral tissue lost almost completely their former weight, although something of old prejudice lingered, and indeed still finds occasional expression in the assertion that prothesis is more successful when even a very small stump of the eyeball is preserved.

Among the objections which may fairly be urged against enucleation the most important is its occasional sequel of fatal meningitis. This danger was early recognized in the case of enu-

cleation during active inflammation of the eyeball and of Tenon's capsule, but it appears to be well established that the operation is in no case absolutely free from risk. Professor Graefe reports two fatal cases from meningitis in a personal experience of about six hundred enucleations, and this estimate of the danger to life incident to the operation cannot be considered excessive. What the percentage of fatal results after exenteration may be, remains to be proved, but it is not unreasonable to hope that it will be less than after enucleation. On the other hand the general adoption of antiseptic precautions may be expected to diminish the mortality after enucleation.

An insurmountable obstacle to the timely performance of enucleation is not infrequently encountered in the strong prejudice which often exists in the minds of patients and their friends against what they consider a grave mutilation. Such persons will sometimes accept a proposal to remove a part of an injured and disfigured blind eye, although they may refuse absolutely to submit, or to subject a child, to the more radical operation. Hence abscision, or abscision with exenteration, must occasionally be accepted as the only practicable resource, even in cases in which the preference of the surgeon might be for enucleation.

Abscision of the anterior portion of the eyeball, with closure of the opening by a horizontal line of sutures, as recommended by Critchett (*Ophthalmic Hospital Reports*, IV., p. 7, *sqq.*) yields, in a very large proportion of cases, an excellent movable stump, free from tenderness or irritability, and of the most suitable dimensions for the support of the lids or of an artificial eye. Unfortunately a few cases have occurred in which it has been followed by sympathetic irido-cyclitis, a result which has been attributed to irritation consequent upon the employment of deep sutures in the sclera and ciliary body or choroid. Accordingly the operation has been modified by the substitution of sutures in the conjunctiva for those in the sclera (Knapp, *Archiv f. Ophthalmologie*, XIV, I, S. 275), but unfortunately, with decided impairment of the immediate results, owing to the tendency of the conjunctival sutures to cut their way out before the scleral wound has become consolidated.

Professor H. W. Williams, of Boston, who has extensively practiced suture of the cornea after flap-extraction of cataract, recommends the use of similar very fine sutures in the sclera after abscision. He uses the finest sewing needles, cut to a length of ten or twelve millimetres and ground to a cutting point, and inserts the sutures close to the margin of the scleral wound. (*The Diagnosis and Treatment of the Diseases of the Eye*, Boston, 1881, p. 121). Inserted in this manner the scleral sutures are quite as effective as in the method of Critchett, and are probably also free from danger; they may be left *in situ* until the scleral wound has become well consolidated or until they come away spontaneously. As thus modified, abscision would seem to be altogether the best operation in most cases of disease confined to the anterior portion of the eyeball. In a case of a large and painful corneo-scleral staphyloma, following an ill-advised attempt to depress a soft cataract in a child, I have thus succeded in preserving, for over twelve years, a stump of large dimensions, perfectly free from irritation and retaining excellent perception of light.

Abscision of the anterior portion of the eyeball with removal of the choroid and closure of the scleral wound by sutures, has also been practiced by Williams (*Trans. Am. Ophth. Soc'y*, 1878.) A patient had been etherized for the purpose of performing abscision for relief from staphyloma, with tenderness of the ciliary region, and as a preparation for wearing an artificial eye; a large bony shell was encountered, lining the posterior two-thirds of the globe, which was removed *in toto*, and the scleral wound closed by sutures. The exenterated scleral sack healed without material shrinkage, and remained free from irritability. The result is stated to have been in every way excellent.

Williams advocates abscision with suture in preference to enucleation, in anterior staphyloma, and, generally, in affections which are confined to the anterior portion of the eyeball (*Op. cit.*, p. 55.) In the case of deep suppuration following abscision, he advises to scoop out the sloughing contents of the globe, leaving only the sclera to form a stump for the support of an artificial eye (*Op. cit.*, p. 122.) In favor of exenteration Wil-

liams urges the same reasons which are now brought forward, namely, the "less risk of septicæmic infection," the value of the remnant of the sclera as a support for the eyelids or for an artificial eye, (*Op. cit.*, p. 121), and the protection against sympathetic inflammation of the other eye, (*Trans. Am. Ophth. Soc'y*, 1878).

In a verbal communication made at a meeting of the American Ophthalmological Society several years ago, Professor Henry D. Noyes, of New York, advocated the complete evisceration of the eyeball as a means of shortening the period of inflammation in panophthalmitis. Writing on panophthalmitis (*A Treatise on Diseases of the Eye*, New York, 1881, p. 189) he says: "For this deplorable state one of several proceedings may be selected; first, more extensive incision, dividing the ciliary region with intentional partial escape of vitreous; or, secondly, the wiping out of the contents of the sclera after making the incision (*evisceratio bulbi*); or, thirdly, enucleation of the eyeball. * * * The choice of one of these methods is to be determined by circumstances. I have found the evisceration an admirable resort, because it yields a better stump for an artificial eye, and more quickly terminates the [suppurative] process than simple division Enucleation is sometimes rather a severe operation, is troublesome to do because of hæmorrhage and orbital infiltration, and leaves a less favorable nidus for an artificial eye. * * * A few cases of fatal issue after such an operation have been recorded.

* * * In hospital practice enucleation is done with more frequency than evisceration, because the subjects are more speedily enabled to resume their work. Yet the other [evisceration] is often practiced, especially for women."

Under the head of *staphyloma* Noyes (*Op. cit.*, p. 195) thus judiciously sums up the comparative merits of the three operative procedures now under discussion. Having mentioned the old operation of abscision of large staphylomata with removal of the lens, he writes:

"But sometimes serious intra-ocular hæmorrhage and grave inflammation of the interior of the eye follow this simple proceeding. In view of this not infrequent liability operations

have been devised for closing up the wound, which should also serve to prevent the loss of the vitreous. Mr. Critchett carries needles armed with sutures through the ciliary region, and leaves them in place until next he abscises the staphyloma, and if needful lets out the lens, then he draws through and knots the sutures. Dr. Knapp makes use of the conjunctiva with the same view, dissecting up a strip of it from the base of the staphyloma, and through this passes the proper number of threads, excises the staphyloma and draws the conjunctiva over the opening. * * * In Mr. Critchett's method the needles perforate the dangerous ciliary zone and may cause serious reaction, including the possibility of sympathetic trouble of the other eye. By Dr. Knapp's method, which is less objectionable, we do not, as I have found, obtain certain immunity from the deep inflammation. If the whole pre-equatorial part of the eye enlarge, the case will be very likely to cause trouble; especially will this be true in delicate persons. Therefore, with large staphylomata whose walls are thin, I advise against both Critchett's and Knapp's operations; I prefer either enucleation, which I might with great reluctance decide to do, or I would cut off the anterior part of the globe and wipe out its contents. * * * For young subjects every palliative proceeding is to be tried in preference to enucleation, especially in females."

Schweigger (*Hand-Book of Ophthalmology;* translated from the third German edition, Philadelphia, 1878, p. 316) objects to Critchett's operation on the score of danger from the deep sutures passed through the ciliary region, and to Knapp's modification of the same operation as ineffective; he advises, rather, to apply sutures of catgut in the sclera after the abscision of the staphyloma, operating under deep narcosis in order to prevent extrusion of the vitreous. Schweigger does not mention exenteration.

In cases of lodgment of a foreign body within the cavity of the eyeball, exenteration, with suture of the scleral wound, affords the most direct way of at once getting rid of the offending body, and removing such of the tissues of the eyeball as are especially prone to suppuration. Conrad Froehlich (*Klinishe Monatsblætter f. Augenheilkunde*, XIX, 1880, S. 30.) reports a case

of abscision of the anterior portion of the eyeball, with complete removal of the contents of the scleral sack and closure of the wound by sutures in the conjunctiva. Healing was accomplished *per primam*, and on the sixth day the patient presented a very movable stump, which, as is stated, permitted better movement of the artificial eye which was subsequently worn than is attained after enucleation.

Of Professor Graefe's paper on *Exenteratio sive Evisceratio Bulbi* read before the *Versammlung Deutscher Naturforscher und Aertzte*, Magdeburg, September 1884, an abstract has appeared in this journal; also extracts from Professor Graefe's reply to a criticism by Professor Manz, of Freiburg. (*Am. Jour. of Ophthalmology*, II. pp. 1, *sqq.*, and 21, *sqq.*) The advantages claimed by Professor Graefe for exenteration as compared with enucleation are thus summed up in his original paper:

1) "There is no wounding of the ways of communication between the orbit and cranium, especially of the lymph sheath of the optic nerve, by means of which the inflammation following the operative lesion is propagated.

2) The stump which is obtained is much superior to that of the enucleated eye. The artificial eye has a greater extent of motion."

In his reply to Professor Manz (*Klinische Monatsbtætter f. Augenheilkunde*, XXIII, S. 49, *sqq.*), Professor Graefe says further:

" 'I am satisfied that there is no difference in the operative technical difficulties of exenteratio bulbi and enucleation.'" Also:

"The healing is often *per primam*; in other cases a considerable reaction (swelling of eyelids, chemosis, and secretion) occurs. In the former case the patients may be discharged on the third to the sixth day; in the latter case the convalescence is prolonged to about the end of the second week, but only on account of the chemosis which continues after all other symptoms of irritation have disappeared."

As cases in which exenteration offers especial advantages, as compared with enucleation or with merely expectant treatment,

he particularly mentions "recent hopeless injuries of the eyeball and beginning or established panophthalmitis."

Regarding the different operative procedures for the removal of a part of or the whole eyeball, the following conclusions may be considered as fairly justified by past and recent experience.

a) Simple abscision of anterior staphyloma (Beer) is applicable only to cases in which the enlargement is confined to the region of the cornea, in which, as a rule, the lens can be preserved *in situ.*

b) Abscision with closure of the scleral opening by sutures (*Critchett, et al.*), is always to be preferred to simple abscision, and is also applicable to cases of more extensive staphyloma in which some portion of the sclera, and also the lens, iris and a part or the whole of the ciliary body are removed. This procedure is applicable even to certain cases of malignant disease when confined strictly to the anterior portion of the eyeball (*Williams*).

c) Abscision, or free incision of the anterior portion of the eyeball with complete removal of the contents of the globe (exenteration), is an effective and useful means of shortening the period of active inflammation in cases of operation in which choroidal hæmorrhage has occurred as an accident, and in cases of incipient or established panophthalmitis (*Beer, Noyes, Williams*).

d) Exenteration with suture of the seleral opening (*Williams, Froehlich, Graefe*) is generally followed by closure of the wound, with preservation of the remnant of the scleral sack; thus affording a useful stump for the support of the eyelids or of an artificial eye, which more or less perfectly approaches in character to the excellent stumps obtained by abscision with suture.

e) Exenteration is, on the whole, as easy of performance as enucleation, and in some cases much easier.

f) Exenteration is presumably less likely than enucleation to lead to secondary fatal meningitis; and there is as yet no evidence that it is attended with any special risks of its own.

9) Exenteration would seem to offer as perfect safeguards against sympathetic inflammation of the other eye, and as com-

plete relief from sympathetic irritation, as does enucleation. An exception to this statement must be made in cases in which a foreign body is lodged behind the eyeball in or near the optic nerve.

h) Exenteration will occasionally be accepted by the patient or his friends in cases in which the proposal to enucleate would be rejected by them, and it may then be the best available resort.

i) Abscision with improved methods of suture, and exenteration with suture of the scleral opening, have already had a somewhat extended trial, and thus far with altogether encouraging results; and it is now entirely admissible to adopt one or the other of these procedures in a considerable proportion of the cases in which enucleation has of late years been generally recommended to the exclusion of less radical methods.

CLINICAL CONTRIBUTIONS TO THE STUDY OF RETRO-BULBAR AFFECTIONS OF THE OPTIC NERVE.

BY SWAN M. BURNETT, M. D., WASHINGTON, D. C.

Affections of the optic nerve posterior to the globe unconnected with grave central lesions, and leading to atrophy more or less complete of the disk, are not so common as to render reports of such cases, even when not accompanied by the post-mortem appearances, without interest.

The following histories are offered as contributions to the clinical study of such conditions.

All of the three cases represent, I believe, the effect of pressure on the nerve, which, however, in but one instance, was accompanied by evidence of papillitis.

CASE I.—*Blindness of Left Eye Rapidly Becoming Total; Followed by Atrophy of the Disk; Return of Vision in the Upper and Lower Inner Field; Paralysis of the First, Third, and Seventh Nerves of the Left Side; Partial Recovery under Anti-Syphilitic Treatment and Electricity.*

Margaret Burgoyne, colored, aged 33, was sent to my service at the Central Dispensary by the late Surgeon-General Barnes on March 30, 1880. She reported that four weeks before she had received a blow on the left temple, which, however, was followed by no immediate consequences. One week later there was pain in the left side of the head which was periodical in character, and a feeling of soreness in the bottom of the left orbit. Vision gradually faded away until ten days ago when there remained no longer even perception of light. The position and movements of the eye were normal, the pupil con-

tracted consensually and not by direct light. Vision and visual field in the other eye normal. An ophthalmoscopic examination showed the fundus to be normal. The color of the disk was good and the size and course of the vessels were not different in any important particular from the other eye. No clear history of syphilis could be made out.

On May 11, when she presented herself again after a long absence from the clinic there was a complete paralysis of the seventh pair in the left side. The eye was closed with difficulty from implication of the orbicularis and the tongue was drawn to the right. This condition had come on suddenly on April 30 after a fainting fit. Vision however had returned to some extent in the upper field, she being able to count fingers at two feet. Ophthalmoscopic appearances unchanged. Wishing to give her the benefit of the doubt, an antisyphilitic treatment was ordered. The condition remained unaltered except that V gradually improved in the upper field until June 22, when fingers could be counted at ten feet. At this time she complained of a loss of the sense of smell. During all this time there were no other symptoms referable to the brain except a headache, which came on for a time periodically at 5 P. M. every day.

On July 2, when I made an ophthalmoscopic examination I thought there was a commencing decoloration of the inner side of the disk, the vessels remaining normal. V. F. as before; the paralysis of the seventh pair under the use of electricity improving.

On October 3, after severe pain in the left side of the head there was a paralysis of the third pair in all its branches. The blanching of the inner side of the disk had steadily advanced until it was now very pronounced; vessels normal.

On January 4, 1881, the paralysis of the third pair had improved and she was able to open the eye slightly. Its V. F. was clearing at the lower inner quadrant, where she can count fingers at five feet. The whole surface of the disk much whiter than on the right side. When seen for the last time on April 29 she could count fingers at ten feet, except in the lower outer quadrant of the V. F., where there was barely perception of light. The disk had not altered materially in appearance from that of

last report. The muscular paresis both of the seventh and third pairs was much better. There was some drooping of the lid, some convergent strabismus, and some distortion of the face. The patient then passed out of sight and I have been unable to follow her history further, though it is a fair presumption that there has been no material change in her condition.

In this case it is apparent that the pressure exerted on the nerve was not intra-orbital. Any inflammation or new growth which could exert sufficient pressure to lead to atrophy of the nerve would give rise to an exophthalmus which was notably absent in the clinical history. The morbid process must, therefore, have affected the nerve either within the optic foramen or between that and the chiasma. That the chiasma itself was unaffected is evidenced by the unimpaired function of the other eye. The soreness at the bottom of the orbit complained of would lead to the supposition of a periostitis of the foramen but this could not alone have made sufficient pressure to lead to atrophy without interfering with the circulation through the ophthalmic artery, and no evidence of this was present.

It seems most probable, therefore, that the pathological process was posterior to the foramen and that it was sufficiently extensive to implicate in time the first and third pairs on that side, which lie in proximity to the second at that point. The most reasonable hypothesis, in view of the recovery under specific treatment, is, that the pathological product was a gumma. The affection of the seventh pair must have been independent and was most likely due to pressure somewhere along its course through the temporal bone. Any important complication on the part of the brain itself can be, I think, excluded.

The important feature of the case from a practical standpoint is the partial return to activity of a large portion of the optic nerve fibres after prolonged compression. Its interest pathologically attaches to the gradual progress of the atrophic changes along the nerve from the seat of injury to its terminus in the optic disk. This latter phenomenon, however, is so common that we can look upon it as almost a characteristic sign of nerve atrophy. The molecular changes attending the

atrophic condition when once set up in any part of a fibre usually extend themselves in time along its whole course.

CASE II.—*Inflammation, Probably Rheumatic, Within the Orbit - Abscess—Signs of Optic Neuritis; followed by Atrophy. Vision Nil.*

Richard Dante, white, aged 34, was sent to my service at the Central Dispensary on November 24, 1882, by Dr. A. P. Rogers, of Washington, with the following history:

He was of a rheumatic tendency and had had attacks at various times of severe rheumatic inflammation of the legs and feet. He had for some time been complaining of a pain (soreness?) in the right orbit. On October 21, 1882, he rode into the country facing a strong wind, and on the 25th signs of active inflammation were manifest in the right eye. The lids were red and swollen to such an extent as to close them. The ball was red and chemotic and protruded so that the cornea was even with the bridge of the nose. There was a flow of tears and great pain. At the end of three or four days something "broke" behind the eye and matter began to run and continued for four days. After this the swelling began to subside.

When I saw him four weeks after the trouble began there was the remains of a chemosis at the lower portion of the ball, in the form of a roll of thickened conjunctiva, but there was no exophthalmus; the movements of the eye were good. The pupil did not dilate on the direct action of light, but did so consensually. V was nil. The O. D. was indistinct in its outline, the arteries seemed small, and the veins large and tortuous. Otherwise the fundus appeared normal. The only fact that could be elicited pointing to syphilis was an eruption on the skin seven or eight years ago, supposed to be barber's itch, which finally got on to the scalp and caused the hair to fall out. He continued under observation for some time and specific treatment was tried faithfully, but with no avail. He was examined again on June, 1884, and his V was still nil. The edges of the disk were ragged, and its surface white, but the size and distribution of the retinal vessels did not depart in any essential particular from that of the other eye.

The features in this case are those which are usually pre-

sented in abscess or extensive inflammation within the orbit, and are all referable to pressure on the optic nerve and opthalmic vessels. The active changes on the disk may have been due in part to an inflammation proper on the part of the nerve, but it seems most probable that the total atrophy was due not so much to inflammatory changes in its substance as to the pressure it sustained from the intra-orbital inflammation; particularly if there was much swelling about the optic foramen.

CASE III.—*Exophthalmus and Paralysis of all the Muscles of the Right Eye; Absolute Blindness. Disappearance of Exophthalmus and Paralysis under Antisyphilitic Treatment; Return of Some Vision; White Atrophy of the Disk. Antecedent White Atrophy with Loss of Vision in Left with Ophthalmoplegia Completa.*

Logan Gray, colored, aged 60, was admitted to my service at the Central Dispensary on June 2, 1882. He had syphilis ten or twelve years ago and three years ago he was affected with severe headaches and loss of V in left eye. Six months later he had left hemiplegia. In this eye there is complete paralysis of all the external muscles; pupil inactive; simply p. l. O. D. white, but with clearly defined edges; vessels very narrow in calibre and scant in number. On the right side there is a marked but not excessive exophthalmus, and complete immobility of the eye but no swelling of the lids and lagophthalmus; pupil dilated but not *ad maximum*; no p. l.

O. S. showed no important changes in the fundus; the disk and vessels appearing normal. There was not a great amount of pain, but some soreness in the orbit which was more pronounced on pressure. The vision in the right eye was said to have been good up to ten days ago, when the protrusion and the accompanying blindness suddenly set in. He was put on an active antisyphilitic treatment. On June 9, his condition was unchanged, and he was seen no more until July 7, when the exophthalmus had entirely disappeared and the eyeball was moveable freely in all directions and the lids could be easily closed. Fingers were counted at two feet and there was no defect in the V. F. O. S. appearances unchanged. On July 18, fingers could be counted at one meter. There was then some blanch-

ing of the disk, but no important alterations in the vessels. The blanching gradually increased up to September 12, 1882, at which time fingers could be counted at two metres. He then passed from observation. I examined him again, however, on June 1, 1884, and found his V = fingers at four meters and V. F. normal for white and no important change for colors. The disk was perfectly white, with no small vessels on its surface, and the arteries were much reduced in size.

The symptoms and appearances in this case point to a periostitis at the apex of the orbit leading to pressure upon the optic as well as the nerves supplying the muscles of the globe. That the pressure on the optic nerve was posterior to the entrance of the central vessels of the retina is evident from the lack of signs of interference with the retinal circulation. So far as the character of the optic nerve atrophy is concerned this case is similar to Case I.

CELLOIDIN; THE NEW MATERIAL FOR EMBEDDING SPECIMENS FOR MICROSCOPIC SECTION CUTTING; ITS METHOD OF USE AND ITS ADVANTAGES.[1]

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The microscopic examination of the eye has always been hedged about by the extreme difficulty of the technique. Especially has this been the case when the examination of sections which cut through the entire eye or any considerable portion was necessary for the elucidation of the point to be examined. To cut through tissues varying in density from that of the sclera to that of the vitreous body has been the problem. To accomplish this some method of embedding is necessary, all of the methods heretofore in use employed the agency of heat to accomplish this, and thus became necessary water-baths, melting apparatus and a very considerable paraphernalia. In addition the tissue to be permeated all through equally should be kept in a moulten solution of the embedding fluid for from twenty-four to thirty-six hours before it is embedded; this, of course, necessitated the maintenance of heat just enough to keep the mass moulten for all this time; if the heat became too great the spec-

1. My attention was first called to celloidin by a brief reference to a paper written on the subject by W. Jennings Milles in the British Medical Journal over a year ago, and after I had written to that gentleman on the subject he kindly replied in full as to his manner of using it. For many of the details of the method herein described I am indebted to Dr. C. S. Minot of the Harvard Histological Laboratory, where my work with this material has been done.

imen was destroyed, if not enough the process had to be recommenced.

All of these things cooperated to prevent microscopic examination of the eye being made, except at some large histological laboratory where all these conditions could be met. The expense of the apparatus and the large amount of room occupied by it effectually prevented the physician from attempting it either at home or in his office.

By the celloidin method of embedding all these objections are avoided. The only pieces of apparatus required are a few large bottles, corks and a few lead weights which any one can extemporize in a few hours. There is no temperature to be continually watched, there is no point in the whole process at which it cannot be immediately and safely discontinued and left with absolute security for weeks or months if necessary.

The whole process is done in closed bottles, so the danger of dust and overturning are reduced to a minimum; it produces no dirt and can be easily used in an office and put up on the closet shelves out of the way when not in actual process of manipulation.

But the great and crowning advantage of celloidin for use in embedding eyes lies in the fact that it is transparent, and so it is not necessary to dissolve out the embedding material in order to stain and mount the section.

The immense advantage of this can be readily seen, as the different tissues of the eye cut in some directions have no connection, so that when the embedding material is dissolved the section immediately falls apart and we can no longer distinguish the relationship of the various parts. The tissues can be stained without coloring the surrounding celloidin at all, and when the specimen is mounted the presence of the embedding material would never be surmised.

The celloidin used by me was manufactured by E. Schering, of Berlin, and comes in the form of cakes about four inches long, two and one half broad, and one-fourth of an inch thick; it is very hard, semi-transparent and resembles in appearance a piece of glue. It can also be bought cut up into fine shavings. To prepare this material

for use it is first necessary to cut or break a sufficient quantity into small pieces and then dissolve it in equal parts of ordinary strong alcohol (95 per cent) and sulphuric ether. It will take forty-eight hours to dissolve and then the solution should be about as thick as a heavy syrup. The proportion is about 14 grammes of celloidin to 100 cubic centimetres of the solvent.

A thin solution of the celloidin should be prepared by taking a portion of the above solution and by adding an equal part of the alcohol and ether mixture.

Method of Embedding.—Immediately upon the removal of the eye it should be placed in Mueller's fluid. The cornea and sclera should first be perforated to allow the access of the preserving fluid to all parts. When the eye has been sufficiently hardened a good method of removing the chromic acid is by simply putting the eye into a four per cent. aqueous solution of chloral hydrate and changing the fluid three or four times in several days. The advantage of this method for office work over that of washing under continuous stream will be obvious.

Next, if the vitreous is to be taken into consideration in the examination about to be made, it is best to freeze the eye and cut it through in an anterior-posterior direction. The specimen being prepared it is first placed in a mixture of equal parts of strong alcohol and ether to remove all traces of water. In this it is allowed to remain for twenty-four hours. In order to permeate the object thoroughly with the celloidin it is next placed into the second or thin solution above described. Here it is allowed to remain for thirty-six hours.

The box for embedding is most conveniently constructed in the following manner. Procure a *cylindrical* cork and wrap about it a piece of stout unruled writing paper in such a manner that it shall project beyond the end of the cork and so form the box. When the paper has been wound twice around the cork the end is secured by a pin thrust directly into the cork. To the lower end of the cork is then attached a leaden weight. The handiest method of accomplishing this is perhaps to insert the head of a pin into a bullet; the pin can then be thrust directly into the bottom of the cork and the weight is then firmly enough attached for all purposes.

The specimen is now placed into the box and the celloidin solution poured into it so as to fill it to two or three times the height of the specimen, and after waiting a few minutes for a film to form on the surface of the celloidin the entire box is submerged in alcohol of a specific gravity of .82.

When this is done often many bubbles of air are forced out of the cork and rise up through the celloidin; some of these are apt to become entangled in the specimen and become a source of annoyance subsequently. In order to avoid this it is a good plan to have the cork in the alcohol and weighted for some hours before the box is made. Another plan, although not so effective, is to cover the upper surface of the cork with a thin coating of celloidin and so to glaze it over before the box is made. At the end of twenty-four hours the paper should be removed and the cork with the embedding mass attached should be returned to the alcohol and allowed to remain until a suitable degree of density has been obtained for section cutting. If this process seems too slow it can be hastened by employing a lower per cent. alcohol, of say 60 to 75 per cent.

When sufficiently hardened the cork can be put in the holder of the microtome. In cutting the section a stream of alcohol should irrigate the knife. The sections are best removed from the knife by the aid of a camel's hair pencil. These sections will be entirely transparent even if the celloidin in the mass appears somewhat opaque.

The sections as fast as cut should be put into 90 per cent. alcohol. The surplus celloidin cut away from about the specimen can be returned to the strong solution and be used again.

A great advantage lies in the fact that the embedded specimen or the sections can be preserved without injury for months if kept in alcohol.

The sections can be mounted entire (embedding material and all.) The staining fluids do not color the celloidin. It does not do to attempt to clear up the specimen in the ordinary way with the oil of cloves as the celloidin contracts and spoils the specimen. The clearing up can be accomplished by following the ordinary methods and by using oil of bergamot instead of

the oil of cloves. The odor of the oil of bergamot would prevent this method in an office however.

A very good and rapid method of clearing up the specimen is as follows: Place the section after staining on the slide it is mounted on, and wash quickly but thoroughly with a few drops of *absolute* alcohol, drain it off and quickly add a few drops of chloroform, enough to entirely cover the section and add thereto drop by drop until the section is entirely clear; then just as the last of the chloroform evaporates from the section drop on the balsam. Another method which is exceedingly advantageous where a large number of sections of a specimen are to be mounted, is as follows: The stained section is placed on a slide and then a few drops of a thin solution of bleached shellac are dropped onto it. The slide is then put into an oven or other warm place free from dust and left until the shellac covering is perfectly hard; it is then treated with oil of cloves and covered.

If the specimen is of such a nature that it will not fall apart upon dissolving the celloidin the sections can be put into a mixture of alcohol and ether of equal parts for twenty-four hours and if sufficient solvent has been used the sections will be entirely freed from the celloidin. If it is for any reason desirable to free the section from the celloidin and at the same time it is from its nature liable to become disintegrated, the best method is to place the section upon a piece of rice paper and then add the ether and alcohol solvent after which the specimen can be easily transferred to the slide.

REPORT OF THE OPHTHALMOLOGICAL SECTION OF THE AMERICAN MEDICAL ASSOCIATION HELD AT NEW ORLEANS, APRIL, 1885.

BY DR. R. TILLEY, CHICAGO, ILL.

The chair was occupied by Dr. A. J. White, of Richmond, Virginia.

Dr. Flavel B. Tiffany, of Kansas City, Mo., read a paper on "Sympathetic Ophthalmia with Calcareous and Ossific Deposits," illustrated by specimens of enucleated eyes, in one of which he exhibited an ossification embracing nearly the whole of the choroid, the bone extending even to the ora serrata, having a small opening opposite the optic nerve through which passed the retina, which was completely detached by the bone. The lens of this eye was calcified "in situ" and the cornea partially calcified and hypertrophied. In another case was shown an ossification of the sclerotic, the only one on record that he knows of.

Dr. Tilley does not think it possible to have ossific metamorphosis in any tissue that has no blood-vessels, hence he cannot understand how Dr. Voorhies can account for ossifications of the lens.

In the eye with ossification of the sclera there was a worm ¼ of an inch long imbedded in the choroid even to the sclera.

Dr. Tiffany supports the theory that sympathetic ophthalmia is a reflected disease and takes its transit through the medium of the ciliary nerves, and he gives the following data:

a. Sympathetic ophthalmia is a plastic inflammation, a form of inflammation peculiar to vascular and not to nerve-tissue.

b. It is an inflammation of the uveal tract, usually of the

ciliary body, frequently involving the iris and choroid while the retina remains intact.

c. In inflammation of nerve-tissues it is the neurilemma or medullary portion rather than the axial part that is involved.

d. The optic nerve-sheath does not enter the eye, but passes over on to the sclera, leaving the nerve to enter the eye as a non-medullary nerve.

e. The ciliary nerves enter the eye and do not leave their medullary portion until they are lodged in the ciliary body (region).

f. The ciliary nerves go to supply, and are intimately connected with the uveal tract and ciliary region, whereas the optic nerve has no immediate connection with this tract.

g. Were the optic nerve the medium of transmission to propagation of the inflammation by extension, enucleation would not be likely to arrest the inflammation.

h. Sympathetic ophthalmia, occurs in eyes, with completely atrophied and even cretaceous degeneration of the optic-nerve.

i. The sympathetic irritation has been arrested by division of the ciliary nerves, near their entrance into the sclera, leaving the optic nerve intact.

In one case sympathetic ophthalmia was arrested by resecting the stump of an eye enucleated some three years previously, in which filaments of the sympathetic nerves were thought to be entangled.

Dr. Herbert Harlan, of Baltimore, reported a case of hereditary glaucoma which in one family had appeared in five successive generations before the age of twenty. The patient, a girl of 17 years of age, was effected in both eyes. $V = \frac{20}{c}$ in each eye. T+1, cupped discs. The mother was seen and examined. The family gave the history of the other three generations. Numerous cousins, uncles and aunts were also blind from some cause.

Double iridectomy was performed with good results.

In discussing the above case Dr. Eugene Smith, of Detroit, the Secretary, claimed that glaucoma often existed even in the absence of increased tension.

Dr. R. Tilley deemed great caution necessary in classifying cases of glaucoma as hereditary, suggesting that a distinction should be made between the heredity of glaucoma and the heredity of certain anatomical peculiarities predisposing to glaucoma.

Dr. Tilley could not agree with the Secretary that glaucoma ever existed without an increase of tension. According to his notion, increase of tension was absolutely necessary to the varied phenomena constituting glaucoma.

Dr. Scott, of Cleveland, was surprised that any one of any experience should consider increase of tension a necessary condition of glaucoma.

The President, Dr. White, had been so accustomed to diagnose glaucoma in the absence of increased tension that he thought it recognized by all ophthalmologists that an increase of tension was not a necessary constituent of the various symptoms of glaucoma.

Dr. Pope, of New Orleans, held that increase of tension was at any rate a fundamental factor in every case of glaucoma. That the cupping of the optic nerve as well as the advance of the iris was the result merely of mechanical pressure produced by an increase of tension.

Several members bore testimony to the influence of heredity in glaucoma.

Dr. T. E. Murrell read a paper on

"Determining Errors of Refraction by Double Images and by Parallax."

By Double Images:—Two small pencils of light from a distant point of light on passing through the pupil near opposite margins will meet in one point in the retina in E. but in separate points in M. and H. Hence if a single point is seen there is E., if two points H. or M., or As. The latter can be determined by trying different meridians, effected by two perforations in a disc 1 m dia., and 1 m apart, which fits in trial frames. Sensitive to $\frac{1}{2}$ D. Correcting glass gives one point of light.

By Parallax:—If a single small perforation 1 m or less in dia. in a disc is moved in straight lines back and forth across the pupil while vision is fixed on a distant object, it will appear

motionless in E.; to move with the disc in M; and in opposite direction in H. In As. the disc should be moved in a line with the faulty meridian to determine the kind and degree of As. Sensitive to $\frac{1}{4}$ D. Correcting glass gives steadiness of object in all meridians.

Dr. Fulton referred briefly to the literature of the subject and to the fact that it is to be found more in the journals of general medicine than in those of ophthalmology. He said that it is generally admitted by ophthalmologists, and by the general profession as well, that there is an intimate relationship existing between the eye strain of uncorrected errors of refraction and certain forms of headache. But this had impressed itself so strongly upon the medical mind, that but few physicians of the present day ever treated a case mechanically without having first settled the question as to whether some kind of optical defect may not be the underlying cause. It was indicated in the paper that certain forms of refractional errors produced certain forms of headache. But in the experience of the writer hypermetropic astigmatism is more apt to produce occipital headache and that the myoptic astigmatism is more apt to bring on the frontal.

The clinical history of a few cases was given illustrating this subject. Some of the cases of frontal or occipital headache, when complicated by frequent attacks of migraine which in some cases was removed and in others mitigated by the correcting glass. But the author thought that the cases of such headaches to be cured by glasses were very few.

As to the nature of the pain it was said that with some cases it was constant but with most cases it came on after prolonged use of the eyes. Some cases suffered with moderate pain all the time, which would always be increased by new work. That a constantly changing field of vision was apt to bring it on.

It was pointed out that all cases of headache associated with an error of refraction could not be cured by the correcting glass; the two points may be a mere coincidence; but if the pain and all symptoms of irritation disappear under the prolonged influence of atropia it is quite certain that the optical defect is the cause of the trouble. By the removal of the eye-strain many

other troubles are frequently reduced which are the result of the reflex induration.

Through the agency of the pneumogastric nerve, palpitation of the heart and various gastric disturbances are also the result of neglected eye-strain.

These very annoying symptoms can frequently be removed and the general health greatly improved by the use of the proper glasses.

During the discussion of the preceding paper our reporter was not present.

TRANSLATION.

The following methods and rules for cystotomy are given by Dr. J. M. Prouff in an article in the *Revue Clinique d' Oculistique:*

1. Simple Capsulotomy.

The capsulotomy with the cystotome is done in the following manner:

First step: Enter the small triangular needle of Desmarres at the upper end of the vertical meridian of the cornea in such a way as to obtain an inner wound about two mllms. in size.

Second step: Enter through this small wound the cystotome into the anterior chamber, as soon as the latter is reestablished, if it had been emptied, and let the cystotome lying on the flat glide down between the cornea and the capsule until it reaches the lower margin of the pupil.

Then rotating the instrument about 90 degrees insert the cystotome in the capsule which you want to cut and draw the instrument towards you until it reaches the level of the corneal incision.

If the cystotome cuts well you will get a vertical incision in the capsule. If the lips of the incision separate sufficiently, the operation is finished. Should these lips not separate sufficiently you must try to enlarge the new pupil by more or less numerous further incisions of the capsule. For this purpose direct the cystotome in the directions which appear to you the mostapreferable in the case.

2. Crossed Capsulotomy.

This method is used only when the simple capsulotomy has not been successful in establishing a satisfactory pupil. This fact will be at once evident to the operator, since the wound lips will approach each other in the future. Therefore, in order to have a pupil, which is to be definitely large enough, it must at first be more than sufficiently large. The operator must, therefore, be guided by his experience before he resorts to the crossed capsulotomy which is at once added to the simple capsulotomy.

Operative procedure. Wait until the anterior chamber is refilled by vitreous or aqueous humor. This will only take a few minutes.

First step: Enter the small triangular needle of Desmarres at or near the external end of the horizontal meridian and about one mllm. inside of the periphery of the cornea, so as to get an inner wound about two mllms. in size.

Second step: Through this little wound enter a blunt hook and let it glide on the flat between cornea and capsule until it has reached the inner margin of the pupil. Then make a rotation of 90° so as to turn the blunt point of the hook towards the capsule; then withdraw the hook, keeping it all the while in the same position.

It is clear that the blunt point of the hook must during this withdrawal fall into the vertical incision made previously into the capsule.

Thus the outer lip of the capsular wound will get caught by the blunt hook and the traction during the withdrawal of the hook will separate the lips of the capsular wound widely and a large pupil will be obtained. * * *

* * * The immense advantage of the simple and the crossed capsulotomy is, that all traction on the ciliary body is lessened.

Moreover, only the most superficial parts of the vitreous body are touched by the cystotome or by the blunt hook, and the small corneal wounds made by a cutting instrument, which causes no contusion, heal immediately. * * *

* * * These advantages are, according to our opinion, sufficient to convert most operators to our or a similar method of operating, * * *

* * * I furthermore hope that the needles of Bowman will gradually be abandoned for a procedure which is at the same time simpler, surer and more easily executed. * * *

J. Hirschberg and A. Birnbacher contribute a very interesting case of hæmorrhagic distention of the dura mater sheath of the optic nerve in the *Centralblatt f. Augenheilkunde:*

* * * F. Z., about 60 years old, has been well up to the spring of 1883. In March, 1883, had an apoplectic fit, in April a second one. Since then his speach is interfered with. Since August considerable weakness of intellect, and especially loss of memory were noticed.

October 1, 1883. Emaciated. Slight paresis of right facial nerve. Exophthalmus. Enormous arterio-sclerosis. Arteria radialis tortuous, pulse visible. Aneurism of right carotis externa of the size of a cherry-pit. First sound of the heart interrupted, second pure. No paralysis of extremities, but can walk only with difficulty and by the use of a cane. Much albumen in the urine, no formed elements. Dementia of a high degree. Functional examination of visual organs almost impossible.

R. E. The ophthalmoscope detects striated hæmorrhages near the papilla; some smaller ones in the centre of the retina; their number is, however, small. No old spots.

L. E. Close to the papilla a white spot; some minute changes caused by myopia.

Eleven days later, October 11, 1883. Death by apoplexy.

The post-mortem examination revealed in the brain fresh, large, intra-ventricular hæmorrhages on both sides and older ones in the process of softening in the left ganglia. There was general atherosis of the arteries, enlargement of the heart with changes in the myocardium, and pronounced interstitial nephritis.

Anatomical examination of the eyes. Both optic nerves have

a spindle-shaped swelling, which commences close to the sclerotic and reaches backwards to a distance of eleven mllms., its largest diameter being six mllms., whilst the diameter of the optic nerve at its entrance into the sclerotic and behind the swelling is four mllms. In a sagital section of the nerve this swelling is seen to be caused by an enlargement of the dura mater sheath, through which the optic nerve runs backwards as a perfectly cylindrical bundle. The space between the dura mater and pia mater sheaths in this swelling is filled with a soft, yellowish-brown substance.

The microscopical examination of transverse sections taken from the optic nerve behind the swelling shows that its sheaths and the trabecules which enter the nerve from the pia mater sheath are perfectly normal. The glia, however, is reduced in quantity and replaced by a fluid exudation, which lies around the fibrillæ in such a manner that it separates their transverse sections from each other in the specimens. The fibrillæ do not show any degeneration and their sheaths are stained in the characteristic manner by Weigert's method. In some places this fluid exudation separates the fibres so widely as to cause interstices of the size of five or six transverse sections of these fibres. The glia nuclei are neither increased nor diminished in number.

In transverse sections of the swollen part the dura mater sheath appears widened, but otherwise unchanged; the lining endothelium is well preserved. The space between the pia mater and dura mater sheaths, which in sections taken from the middle part of the swelling is one mllm. in breadth, is filled with a wide-meshed network of considerably swollen arachnoidal trabecules, part of which have lost their fibrillar structure and look wax-like. The endothelial cells attached to these trabecules are mostly well preserved. The meshes of this network are filled with a finely granulated, untinted substance which contains a large quantity of round cells, nuclei and red blood-cells. The pia mater sheath and the optic nerve show the same conditions found in the sections from behind the swelling. The central blood-vessels are intact.

The most peripheral part of the optic nerve (three mllms. in

length) was cut longitudinally together with the posterior part of the eyeball. In such sections the substance filling the intervaginal space is seen gradually to diminish in quantity, but it reaches up to the sclerotic and the œdema of the optic nerve reaches through the lamina cribrosa into the retina surrounding the optic papilla. * * *

In an article "Experiences in Regard to the Therapeutic Value and the Manner of Administering Cocaine in Ophthalmology," by Dr. Bol. Wicherkiewicz in the *Centralblatt f. Praktische Augenheilkunde*" the author states:

"* * * I also use cocoaine in cases of trachoma where I desire to perform a painless operation of squeezing or scraping out trachoma granules. In paretic or paralytic muscles of the eye cocaine proved to be an admirable remedy, as it enabled me to apply the electrode immediately to the effected muscle without causing any pain to the patient.

In applying faradization in this direct method I observed a more rapid amelioration than in similar cases where the electric current had been applied according to the old method viz., through the closed eyelids.

Similar to this method Dor used the remedy for healing spontaneous mydriasis. In regard to the removal of foreign bodies or other small operations, I fully agree with Hirschberg that a skilled operator may get along without the remedy, but that it will prove of incalculable value to the less skillful colleague. In dispensary practice, where the number of patients is very large, the administration of cocaine consumes too much valuable time, therefore I use the remedy only in cases when the foreign body has penetrated deeply into the substance of the cornea, or when the patient reveals an extraordinary irritability while opening the eyes.

Cocaine, administered to patients suffering either from secondary or idiopathic blepharospasm shows excellent results. A patient, who had been suffering for four weeks with very annoying blepharospasm was benefitted after a single instillation of a 5 per cent solution and permanently relieved after several more applications. A short while ago, I treated a lady who had suffered for one year from photophobia due to hyperæsthesia retinæ,

photopsia, etc. She had been in the habit of remaining in a dark room and protecting her eyes with smoked-glass spectacles and an eye-shade. Nothing could convince her of the absurdity of such protective measures. After I had instilled several drops of cocaine into the eyes, patient opened them and consented to do away with her spectacles and eye-shade and was able to use her eyes in a moderate light.

Numerous times have I had occasion to observe cases in which blepharospasm through some slight cause exists producing a flow of tears and irritability of the retina from pressure and this irritability again causes blepharospasm where cocaine acts like a charm in breaking up this circulus vitiosus.

A valuable peculiarity of cocaine, which assists us in therapeutic purposes and examinations of the eye, is its mydriatic effect.

This effect was observed in a most varied manner in numerous cases. In some, the pupil was dilated after the lapse of ten minutes, in others, after several instillations, mydriasis set in after half an hour, or even an hour, and in still others, where the pupil seemed to be morbidly contracted, repeated application showed no effect.

Cocaine evidently did not act powerful enough in the above cases to overcome a spasmodic contraction of the sphincter pupillæ, which is decidedly the case with atropia as its acts by paralizing the sphincter. After the pupil has been dilated, cocaine will take effect.

In regard to the paralysis of accommodation I made the following observation:

Irrespective of frequent instillation a paralysis was absent in some cases, in others it corresponded to 0.75 to 1.0 D. It is therefore not to be wondered at that with such different results there are different opinions in regard to the action upon the accommodation. As I am now treading upon disputed grounds, permit me to call the attention to another point of direct controversy. I refer to the reaction of cocaine in connection with the cautery and astringents, especially nitrate of silver and cuprum.

Panas maintains, that cocaine has no anæsthetic effect upon a diseased eye. He says:

"L'oeil pathologique, on peut mieux dire, l'oeil enflammé, se montre plus on moins réfractaire á l'action anesthésiante de la cocaine. Likewise Dr. Blanc & A. Chevallerean (*LaFrance Medicale*, 20 Novembre, 1884).

E. Meyer, (*Revue général d'ophthalmologie*, 31 Octobre, 1884), is of the opposite opinion. He has convinced himself that cocaine produces anæsthesia of the inflamed conjunctiva and connea just as it would act upon the healthy tissues, and that the cauterization of such conjunctiva produced no pain, as long as the instillation of cocaine was continued. As soon as the anæsthetic action of cocaine ceased pains would recur.

In the face of such opposing assertions we must observe the following two points: Whether cocaine produces entire anæsthesia of the inflamed membranes or only reduces its sensibility? and further, whether cocaine applied previously to caustics and astringents does away with pain?

In regard to the first question, I may answer in the affirmative. In some cases of painful acute inflammations of the conjunctiva, nay in iritis sive iridocyclitis, also in various forms of inflammations of the cornea, cocaine, applied either directly or hypodermically (0,01—1,02) produced a diminution of pain lasting about 15—20 minutes.

It is evident that cocaine is very effectual in affections of a trophic nature. Thus I observed an elderly lady who had been operated on by me for cataract some years ago with herpes corneæ on the operated eye to be relieved from most intense pain upon an application of a 5 per cent coc. hydrobrom. salve and compress bandage. The bandage was removed after 24 hours, when the shed off epithelium was regenerated, the cornea had cleared up and patient was free from pain. This affection recurred several times and was treated successfully in the same manner. As to the final result I can say nothing, as patient still remains under treatment.

Dr. Alt relates a case of a very dangerous inflammation of the iris, where all other remedies failed to give relief until cocaine was instilled with the very best results.

In regard to the second question, viz., the influence of cocaine upon the cauterized conjunctiva, I would like to state the following:

In cases where I applied a weak solution of cocaine previous to cuprum and this latter in a very gentle manner, patient generally experienced pain more acutely after one-quarter of an hour, than he would if the latter had been applied gently without previous cocaine. However, if a 5 per cent or 10 per cent solution of cocaine was instilled every five minutes, and the copper applied, patient would be free from pain after 15—20 minutes provided he would bathe his eyes in cold water. If the latter precaution is not observed pain will follow.

The reason for this is, that a weak solution of cocaine does not contract the blood vessels sufficiently. After a short while the contraction is replaced by a relaxation of the vessels with hyperæmia; as the caustic has been more or less dissolved in the tears, which are in the conjunctival sac, the patient feels the effects of it.

It is true in using a strong solution of cocaine pain disappears immediately, but as anesthesia diminishes the flow of tears, a strong concentrated caustic solution remains in the conjunctival sac and exerts a more powerful and lasting effect, which shows itself directly after the anesthetic subsides. The pathological secretion of the conjunctiva is lastingly diminished. A patient suffering from obstinate follicular conjunctivitis on whom I had been using cuprum with previous instillation of cocaine told me the following day that she had experienced greater pain than usual but that she was able to open her eyes without any difficulty in the morning. In fact I found the conjunctiva less swollen, the secretion ceased and follicles diminished.

Of late I have had occasion to use the new anesthetic in making iridotomies, and the patients thus operated upon did not perceive the least pain. No hæmorrhage from the iris took place, the artificial pupil became considerably larger after the pupillary membrane was cut, which was surely caused by the action of the cocaine on the radiary muscular fibres of the iris, which draw this membrane towards the periphery. I even think

that this peculiarity of the cocaine is apt to play an important role in iridotomies * * *.

* * * Since I use cocaine I have not seen a case of spastic entropium under a compressive bandage, even when there was a tendency to it * * *.

It is well known how difficult it is to examine the refractive status of the eyes of the newly born. In this direction cocaine will be of no small service by enlarging the palpebral fissure and the pupil and by removing the oscillating movements of the eye and the contractions of the lids. (I have not been able to convince myself of a lasting influence exerted by cocaine on nystagmus, although the involuntary movements of the eyeball seem to be reduced for some time in extent and frequency.)
* * *

CORRESPONDENCE.

The following letters have been received concerning Dr. Fiske's paper in the January number, on "Evisceration of the Eye-ball."

ZANESVILLE, Ohio, April 3, 1885.

Adolf Alt, M. D.:

DEAR DOCTOR.—I have read the article "Exenteratio sive Evisceratio Bulbi"—Graefe Bunge operation—reported by G. F. Fiske, M. D., in the January number of the AMERICAN JOURNAL OF OPHTHALMOLOGY. That this operation is original with Prof. Alfred Graefe, of Halle, there can be no doubt. But I do not believe that a similar operation has not been done by others before Prof. Graefe published his method. For who in performing the operation of abrasion of the eye-ball has not found, after incising the sclerotic, the contents of the bulb atrophied and presenting loosely in the now open bulb, and as such structures could only be a nidus of disease, has grasped them with forceps, drawn out the remains of choroid retina, atrophied ciliary muscle, diseased iris, and cut them off with scissors as close to the front region of the sclerotic as possible, leaving nothing but the internal denuded surface of the sclerotic and the latter membrane otherwise intact and the capsule of Tenon

unopened. In the winter of 1866–7, while lecturing before a class of one of the medical schools of Columbus, Ohio, and at the Ohio Penitentiary, I did the following operation on an adult, probably of fifty years of age (I write from memory): Desiring to abscise, I transfixed the sclerotic transversely in the semi—diameter and horizontally, about one-sixteenth of an inch posterior to the sclero-corneal junction, with a Beers' cataract knife. The upper section completed, the corneal flap was seized with forceps and the lower section affected similarly to the upper, with scissors. The lens was atrophied and the remains of shrunken retina, choroid and iris fell forward into the anterior opening, now made in the eye-ball, and being, attached near and back of the sclero-corneal junction, were seized with forceps and divided with scissors close to their attachments, in all the circumference of the sclerotic; and in doing this the diseased structures were drawn out so as to expose the anterior attachments to the sclerotic. The patient was chloroformed. In this case I did not bring the edges of the sclerotic or conjunctiva together, but the now eviscerated bulb was left open and the eye cavity and bulb were washed out frequently with disinfecting fluids, and iced compresses were applied to eye externally. The man made a rapid recovery and without complications. This operation differs in details from that Graefe, but the two are similar in principle; but Graefe is of entitled to the credit of publishing first and of formulating a plan, meeting the wants of every abscision, and for taking a bold stand against the wholesale enucleation of eyeballs as now so generally practiced. He seems to have been led to the adoption of his plan by the fear of sepsis through the lymphatic channels of the eye, due to enucleation as well as the ill results of the latter operation. It is a question if it would not be better to omit the sutures in the conjunctiva, that all discharges may flow out from the cavity of the sclerotic and it be reached by disinfectants.

From my favorable experience with abrasion I am disposed to believe in the Graefe-Bunge operation, but would prefer to omit the sutures. Certainly in this operation the parts which are the most vascular are removed, thus avoiding inflammation, and

at the same time, the terminals of the ciliary nerves are cut off, and also the branches of the long ciliary nerves dissected out of their grooves in the sclerotic, and divided posteriorly, and at the points at which they perforate the sclerotic, and leaving the comparatively non-vascular and insensitive sclerotic intact. If no sutures are employed I do not believe sepsis will occur through the few lymphatic channels formerly leading from the choroid through the sclerotic and into the lymph spaces about the eye-ball.

It remains to be seen what is the value of this operation. Perhaps it should be added that I referred to the operation of myself, at the meeting of the American Medical Association in June, 1883, before the Ophthalmological Section. See Journal American Medical Association, 1883, p. 299.

Should you think this hasty letter worthy of a place in the AMERICAN JOURNAL OF OPHTHALMOLOGY, please publish it.

Very Respectfully,

H. CULBERTSON, M. D.,

Capt. and Assistant Surgeon U. S. Army, Retired.

To the Editor of the American Journal of Ophthalmology:

DEAR SIR:—My attention has been called to the January, 1885, number of your journal. The first paper is by Dr. Fiske on "Evisceration of the Globe."

With your permission I will correct what appears to me to be an inaccuracy therein.

Dr. Fiske does me the honor to mention my name in connection with the operation but leads your readers to suppose that Dr. Graefe had covered all the ground assumed for him in Dr. Fiske's communication. This is not so.

Dr. Graefe in his original paper, a reprint of which I have by me, makes not the slightest reference to the *preventive treatment of sympathetic inflammation* by eviscerating the contents of the globe; this is done for him subsequently by Dr. Fiske, and it is

only just to assume that Dr. Graefe's views on that point are an afterthought.

I wrote to Dr. Graefe in reference to this very point shortly after the publication of his first paper claiming for myself the far more valuable end to be attained, viz., exemption from the danger of *secondary inflammatory affections of the sound eye.* I received a courteous reply for Dr. Graefe from Dr. Fiske in which he makes no claim for Graefe's operation except as a preventive of "meningeal complications" but after the receipt of my letter explanatory of my views, he publishes the article in your journal. For confirmation of the above please refer to *Centralblatt f. Augenheilkunde.*

I beg leave to remain, faithfully yours,

P. H. MULES,

MANCHESTER ENG., January, 1885.